

## **PHYS-C1380 Multi-disciplinary energy perspectives (5cr)**

### **Background**

Energy is one of humankind's grand challenges linked to climate change, human development, sustainability, economy, and innovations, among others. Finding effective solutions to these will require stronger systemic thinking and multiple skills, beyond the specific technology knowledge.

Multi-Disciplinary Energy Studies (MES) is a new Aalto-minded approach to the energy and society nexus. It is an elective master's Minor, with three major perspectives into energy: science & technology, economics & business, and social sciences & human behavior.

The Multidisciplinary Energy Studies (MES) is a collaborative teaching effort between several disciplines of Aalto University, such as system analysis, energy sciences, information technology, business, economics, social sciences and art and design.

### **PHYS-C1380 Multi-disciplinary energy perspectives**

PHYS-C1380 "Multi-disciplinary energy perspectives" is an introductory course to modern thinking in energy. The course deals with key factors that influence the way we use and produce energy, how different disciplines approach energy and why, and to apply your own discipline in energy problems.

The course discusses foundational elements and solutions for energy through combining science and engineering, economics and business, social sciences and human behavior. Applying multi-disciplinary thinking to real-life energy case problems and understanding the links between different disciplines and the complexity of energy, through cases such as: Sustainable Energy, Green-ICT, Energy Markets, Green Business, Smart Power, E-Mobility, among others.

### **Course Outline**

**The course starts with the first lecture on Monday 17<sup>th</sup> January.** Lectures are on Mondays and Thursdays at 14:15 - 16:00 via Zoom. Note that some of the lectures are on the exercise session times on Mondays. After each lecture the students are to write lecture diaries that constitutes to 40 % of the course grade in total. Exercises and group work presentations are normally on Mondays at 14:15 - 16:00, also via Zoom.

**All online teaching in the course takes place via Zoom here:** <https://aalto.zoom.us/j/68363117688>

The detailed course schedule will be made available on course pages in MyCourses.

The course is obligatory to students, who will take the MES Minor, but all students interested in the 'energy and society'-theme are welcome. The course is for master's or post-graduate students mainly, but advanced Bachelor students are also welcome.

## **Structure of the course**

The course has three learning elements, explained below:

1. Lectures (online) and lecture diaries (homework)
2. Exercise sessions (online)
3. Group work (independent teamwork, project presentations online).

### **1. Lectures and Lecture Diaries**

#### **a. Lectures**

Format: two hours Zoom Lecture sessions with invited speakers; eight lectures: total 16 hours lectures.

The lecture slides will become available in MyCourses web pages after the lectures. Some lectures or related pre-reading material will be published before the lecture sessions, in which case students will be informed about those by messages from My Courses web page of the course and emails in advance. The online lectures will be recorded and shared with the participants.

#### **b. Lecture Diaries**

The lecture diaries should be submitted either in a pdf or a Microsoft document file format to MyCourses web page of the course before the beginning of the next lecture session each week. The diaries should be written in English language, making use of Times New Roman with font size 12 and 1.5 line spacing. The lecture diary should not exceed more than 2 pages maximum for each lecture session unless otherwise mentioned specifically. Instructions on writing the diaries are elaborately published in MyCourses section for assignments.

### **2. Exercises**

Learning and applying methods and cases. Format: Guided online exercise session.

Three 2-hour exercise sessions, each including group discussions, group work around a key question and unwrapping and discussion within the active session. Exercises are mandatory to attend and only in very special cases can be pre-negotiated before absolutely necessary absence. The exercise sessions will also have updates for course progress and elaborate explanation for group work and all other assignments that are necessary to pass the course.

Lecture material, exercises instructions will become available through MyCourses.

### **3. Group project work**

The latter part of the course involves a group work on a selected multidisciplinary energy topic. A list of topics with short description will be given, but participants are also welcome to propose their own topic (within the general scope and spirit of the course). Period IV is devoted to the group work, but the teams can start working already earlier.

- 9 groups of 3 - 5 persons (ideally 4)
- Project topics are related to the topics of the lectures
- Progress and results reported through three presentations:
  1. Progress presentations
  2. Dress rehearsal presentation
  3. Final presentation
- Each group acts as opponent to one other group, giving constructive feedback

Project topics and organization of the project work part will be introduced later in the course.

## **Assessment and grading**

The **minimum requirements for passing the course** are:

- Real time attendance to at least 6/8 of the online lectures
- Real time attendance to all exercise sessions
- 1 - 2 missing attendances can be compensated with an extra assignment, or by attending some other energy-related Aalto talk or event and writing the lecture diary assignment on it (the event must be agreed with the teacher in advance).
- All (8) lecture diaries (homework) accepted
- All three group work presentations accepted
- All peer assessments submitted
- Opponent tasks contributed as part of a team

### **Grading and assessment principle**

The course grade is combination of the individual students' grade (40 %) and group grade (60 %) and consists of the following parts:

<b>Individual work</b>	<b>Weight</b>	<b>Scale</b>
8 lecture diaries / assignments	5% x 8	0 – 5
<b>Individual grade</b>	<b>40 %</b>	
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<b>Teamwork</b>		
Group work presentations:		
Progress presentation	10%	0 – 5
Dress rehearsal pres.	20%	0 – 5
Final presentation	30%	0 – 5
<b>Group grade</b>	<b>60 %</b>	
<b>Total</b>	<b>100</b>	

Note: Note: Poor opponent performance can lower the grade and outstanding opponent performance can increase the grade.

### **Peer assessments**

Peer-assessment will be used also to estimate the amount and quality of the individuals' contributions to the group's work. In the peer assessment, each member of the group evaluates his/her own as well as other group members' contributions to the team's work and results anonymously. The result of the peer assessment can increase or decrease the individual's grade compared to the group's grade.